

REVIEW OF AGRICULTURAL RESEARCH

HEARING

BEFORE THE

SUBCOMMITTEE ON CONSERVATION, CREDIT,
RURAL DEVELOPMENT, AND RESEARCH

OF THE

COMMITTEE ON AGRICULTURE
HOUSE OF REPRESENTATIVES

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FRIDAY, AUGUST 12, 2005

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON CONSERVATION, CREDIT,
RURAL DEVELOPMENT AND RESEARCH,
COMMITTEE ON AGRICULTURE,
Miles City, MT.

The subcommittee met, pursuant to call, at 1:32 p.m., at the USDA, ARS Fort Keogh Livestock and Range Research Laboratory, Miles City, MT, Hon. Frank D. Lucas (chairman of the subcommittee) presiding.

Present: Representative Lucas

Also present: Representative Rehberg.

Staff present: Ryan Weston, subcommittee staff director, and Nona S. Darrell.

OPENING STATEMENT OF HON. FRANK D. LUCAS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OKLAHOMA

Mr. LUCAS. This hearing of the Subcommittee on Conservation, Credit, Rural Development and Research will come to order, and I would like to open with a few very brief opening comments before we turn to our colleague and to the witness.

Good afternoon, and welcome to the subcommittee's hearing to review agricultural research. Being the chairman of the subcommittee in charge of oversight for research has given me the opportunity to see and hear about much of the fantastic research being done across the country that enables U.S. producers to be continuing among the most competitive producers in the world.

As a cattle rancher and wheat farmer, it is hard for me to think of many places that would have more research that I really care about personally than right here at Fort Keogh. From the Bovine Genome Project to weaning and drought strategies, Fort Keogh is working on issues of great importance to Montana and U.S. producers as a whole.

Fort Keogh's work on genetics, physiology, nutrition, rangeland research will help to make producers better informed and prepared for environmental, consumer, and management issues.

I would like to thank Congressman Rehberg for coming to Miles City to join me today. He's a great advocate in the Nation's capital for the agriculture interests.

And I would also like to personally thank Dr. Heitschmidt for working with my staff to arrange our visit today. This is a wonderful facility, and we have had a very pleasant meeting so far with

many of the local members of the community. I'm very interested in the research that's performed here.

And I would also like to note that even though having been a Member of the U.S. House of Representatives for 11 years and a member of the State house of representatives before that, I have certain apprehensions, but I am honor bound and pleased to note that both Senator Burns and Baucus have good people here today to be a part of this process. Thank you for coming. And as an old House member, that shows a little prejudice, but nonetheless, thank you for being here.

And with that, I would like to state that I look forward to the testimony and turn to my dear colleague, a former member of the Agriculture Committee, who is now a member of the House Appropriations Committee, which, as you note by looking around here is a very important thing.

OPENING STATEMENT OF HON. DENNIS R. REHBERG, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MONTANA

Mr. REHBERG. Thank you, Mr. Chairman. And it's a pleasure to be with you all, as well. I will not belabor my comments, but to say thank you. Having had a history of working with both Congressman Marlenee and Senator Burns over the years, I have had a long and wonderful relationship with this research facility.

And under the capable management of Dr. Heitschmidt, we have got a lot of things to offer the rest of the country. My welcome, as well, to Senator Baucus' and Senator Burn's group. I usually say will you talk a little slower so the Senators can keep up over strategy, but that's not necessarily true. And I apologize for always picking on the Senate, but, like you, I have always served in the House of Representatives, as well.

But this is a great opportunity to have you here, Frank, and I really appreciate you taking the time out of your busy schedule. And it is a busy schedule, I know—and time away from your family. And to your wife, Linda, as well, thank you for joining us in Custer County, Miles City, Montana. You've got a lot of things to see, I hope, today in spite of the weather.

We were commenting at lunch that I apologize if you think that this is the wettest drought in record, but it is. We have had an interesting year, but we still have a drought going. This little amount of moisture that we have had this year does not replenish the water that we so aptly need. And we're all praying for more rain and quite a bit of snow this winter.

But we have today a lot of things to offer America. And with their capable leadership in the Agriculture Committee, I know that we will continue to keep the focus on research, which is so important to the agriculture community and the families that depend on that research.

Thank you for being here. It means a lot to me, and I know it means a lot to the people that are sitting in the audience in Montana.

Mr. LUCAS. Thank you. As a western Oklahoman, let me note, even if it is a rare sprinkle, I like being anywhere that it is raining. So this is just great.

With that, let's turn to our witness, Dr. Rod Heitschmidt, research leader at Fort Keogh Livestock and Range Research Laboratory. We're ready whenever you're ready, Doctor.

STATEMENT OF RODNEY K. HEITSCHMIDT, RANGELAND ECOLOGIST AND RESEARCH LEADER, AGRICULTURAL RESEARCH SERVICE, U.S. DEPARTMENT OF AGRICULTURE, FORT KEOGH LIVESTOCK AND RANGE RESEARCH LABORATORY, MILES CITY, MT

Mr. HEITSCHMIDT. I appreciate it. If you would like to join me, I'm going to try to use a Power Point here and very briefly give some overview of Fort Keogh and what we do at this location.

Mr. Chairman and Mr. Rehberg, on behalf of the entire Fort Keogh staff, I want to welcome you to Fort Keogh and express our gratitude to you for this opportunity to provide a brief overview of the rich history of Fort Keogh.

As I think you already know, we are very proud of our past, present, and anticipated accomplishments, and we thank you for honoring us with this opportunity.

First, some early history. The Cantonment at Tongue River, the precursor to Fort Keogh, was established near the mouth of the Tongue River in August 1876, following the Battle of the Little Bighorn in June 1876. Fort Keogh was named after Captain Myles Keogh, who perished with General Custer at the Battle of the Little Bighorn. Miles City was named after Colonel Nelson Miles, the first commander of Fort Keogh.

By the end of 1877, Fort Keogh had become one of the largest Army posts in the U.S., and was considered the most livable post of the West.

Fort Keogh continued as an Army post until October 1908. Then in 1909, Fort Keogh was resurrected as a remount station raising horses for the U.S. Cavalry. In 1924, the remount station was closed, and the 100 section Fort was turned over to the U.S. Department of Agriculture.

Now, for a more detailed history of Fort Keogh as a military post, we recommend reading the California State University Master of Arts thesis of Josef James Warhank, entitled "Fort Keogh: Cutting Edge of a Culture." A copy of the thesis can be found on the Fort Keogh Web site.

Now, as to our early research history, the focus of the earliest research at Fort Keogh was on animal genetics and rangeland ecology and management with animal reproduction and nutrition playing key contributing roles.

Animal genetics research has always played a key role at Fort Keogh, as we have conducted pioneering animal genetic research since 1924 on sheep, milking shorthorns, Belgian Morgan, and thoroughbred horses, turkeys, swine, and beef cattle. Today, however, our on-station genetics animals are limited to two beef cattle herds.

Although it is not well-known, it is worth noting that Fort Keogh researchers conducted the original crosses of turkeys that led to the development of the Beltsville White breed, the first meat-type tur-

key developed in the U.S., and we also developed the Montana No. 1 breed of hogs.

But without doubt, Fort Keogh's greatest claim to genetics fame is its Line 1 Hereford cattle, the oldest and probably purest line of Herefords in the entire world, having been line bred at Fort Keogh since 1934. Today, the Line 1 selection project is the longest running beef cattle selection experiment in the world.

The importance of these animals to beef cattle genetics research is clearly reflected by the selection of a Line 1 female, L1 Dominette 01449, as the basis for the international effort to sequence the bovine genome.

In addition, it has been estimated that greater than 70 percent of all U.S. purebred Herefords have some Line 1 breeding in their pedigree.

Understanding the fundamental relationships between animal genetics, nutrition, and reproduction has always been an important aspect of the Fort Keogh research program, with much of the focus of our reproductive physiology research on understanding and developing management strategies that reduce calving difficulty, accelerate heifer development, and enhance postpartum breeding.

Likewise, animal nutrition research has always been a cornerstone of the Fort Keogh animal research program. In the early years, the nutrition work focused on determining the nutritional value of various locally produced feedstuff. However, over time much of our focus has been on quantifying the seasonal dynamics of forage quality and developing supplementation strategies for overcoming periodic shortfalls.

The focus of our rangeland ecology and management research has always been on developing management strategies and tactics that insure the health and long-term sustainability of rangelands as a grazing resource. Grazing is the oldest and most sustainable form of agriculture known, and our program has always focused on identifying those management strategies that capture this unique aspect of rangeland animal production systems. For example, the first long-term stocking rate studies conducted in the U.S. were initiated at Fort Keogh in the 1930's.

In terms of current resources, today Fort Keogh consists of about 85 sections of land consisting of about 49,000 acres of native rangeland, 2,000 acres of seeded dryland pasture, 1,000 acres of seeded irrigated pasture, 800 acres of irrigated cropland, 1,250 acres of Yellowstone River, and 1,350 acres of corrals, headquarters area, I-94, et cetera. We have about 220 miles of roads and vehicle trails, 400 miles of fence, 15 wells, 20 reservoirs, and five developed springs.

Our current animal inventory is 1,550 breeding cows and heifers, 86 breeding bulls, and 1,061 calves, and 24 working horses. The full time USDA-ARS staff consists of 10 scientists, 11 technicians, and seven administrative personnel. Our Federal budget for fiscal year 2005 was 3.1 million.

Fort Keogh is run in cooperation with the Montana Agriculture Experiment Station. Our full-time experiment station staff consists of 18 ranch and farm technicians, two professionals, and one administrative assistant. Funds to support this staff are generated through a specific cooperative agreement between ARS and the ex-

periment station, and by the sale of livestock. This is possible because all the livestock at Fort Keogh belong to the experiment station. No State of Montana funds are appropriated for the operation of Fort Keogh. Our fiscal year 2005 experiment station sales budget was \$655,000.

In addition, two full-time Montana State University Extension Service personnel are officed at Fort Keogh.

Fort Keogh has a full cadre of farm and ranch facilities and equipment. We have a modern laboratory/office complex; a 39,000 bushel, 26 bin automated feed mill; two feedlots with a total capacity of about 1,000 head; plus 45 other buildings, including barns, sheds, shops, storage garages, et cetera. We have three buildings listed on the National Register of Historic Places, with the oldest being the recently restored water wagon house built in 1883.

In terms of current research projects, the mission of the Fort Keogh Range and Livestock Research Laboratory is to research and develop ecologically and economically sustainable rangeland based livestock production systems. Our program centers around the two fundamental components of these systems, that being the rangeland resource itself, and the grazing animal.

The focus of our rangeland research program is to develop sustainable management schemes that reduce both ecological and economic risks. Research centers around the idea that rangeland agriculture; that is, grazing, is a high risk venture subject considerable ecological and economic risks. Its sustainability is linked, therefore, to a rancher's ability to manage high levels of uncertainty over both time and space. The project is supported by 5 scientists.

Examples of recent accomplishments include the successful development of a simple, user-friendly, drought management decision support system; the identification of "best management" post-fire grazing tactics to enhance the ecological health of the range resource and concurrently reduce economic losses sustained from wildfires; finding that rates of carbon sequestration in these grasslands are generally low and they are affected more by climatic conditions than grazing tactics; and determining that late spring, that is, June, calving can increase profits over late winter and early spring calving largely by reducing input costs.

The focus of our animal research program is to develop a productive, ecologically superior beef cow. The central theme of this project is to lay a foundation for accelerating genetic improvement toward more efficient, profitable, and sustainable beef production by reducing input costs arising from the use of harvested feeds. It is predicated on the assumption that the future cost of external energy needed to produce harvested feeds will increase markedly, causing a concurrent increase in costs of traditional production systems. Acceleration of genetic improvement requires selection criteria of higher heritability that can be measured earlier in life than those presently available. The project is supported by 4 scientists..

Examples of recent accomplishments include the development of sire selection indices that optimize profit from future progeny; the identification of size of ovulatory follicle as a key indicator of cow reproductive capacity; the discovery of key quantitative growth, carcass characteristics, and palatability of beef; and providing key resources for the international bovine genome sequencing project.

For a detailed explanation of all of the ongoing research projects supporting the above two research projects, we invite you to review our published 2005 research update found on our Web site.

And with that, I thank you and I would be happy to answer any questions that you might have, Mr. Chairman.

[The prepared statement of Mr. Heitschmidt appears at the conclusion of the hearing.]

Mr. LUCAS. That's a fitting conclusion slide, because one of the things that we are challenged with in these days with Congress is focusing on how agriculture production coexists with the rest of the environment. And having been in western Oklahoma and observed that to be the case, I know that's a factor everywhere else.

Could we focus just a moment, Doc, on your recent examples of accomplishments and tell me about things such as the growth management, decision process, how that has helped Montana, and, for that matter, ranchers in the entire region cope with the struggles of the last few years, which your congressman so clearly pointed out.

Mr. HEITSCHMIDT. Well, the problem when you have drought, one thing is that you don't produce enough forage. The second thing is understanding when that forage is produced. And over a number of years what we have learned is that 90 percent of our forage is produced in this part of the country by July 1, on the average, of our perennial grass forage.

That means that a rancher can walk out to his ranch and look on the ground and say that's about it for the year. And it gets them in a mind-set that they can do something now.

I do a presentation called "You have to run out of forage before you manage." And the idea is that ranchers are eternal optimists when it comes to rain. They always believe it's going to rain tomorrow, just the same as a farmer does. And can you imagine what mental state you would be in if you didn't believe that. It would be terrible. So it is important to be optimistic, but it is also important to be able to look and say, well, the rains are pretty slim.

There is a Web site that we tie into where they can go and look up what's the probability at Miles City of getting 12 inches of rain in the month of July. And I can tell you, it's about 40 percent. Getting 2 inches is 10 percent. So that's based on long-term weather data.

They can look at that and say—well, the first question is what's the probability I'm going to get decent precipitation. They can go get that information right off the Web site, and then they can take their chances.

The second thing is they need to understand that if I do get that rain, how much good is it going to do me. And we argue that an inch of rain in July is not worth an inch of rain in May. So we're trying to quantify it right now, and we have worked some on it.

Last year we did an experiment when we irrigated in July and August to see how much we could raise, how much forage we could raise, and it was a reasonable amount, but we put 3 inches of precipitation. Do you want to know what the odds are of getting 3 inches of precipitation in May and three inches in July in Miles City?

It is 1 percent.

So we wanted to ask the question, what's the probability that you get that. And if you do get the precipitation, what good does it do. So it has been very helpful.

I wanted something that they didn't have to go to the computer and do all these sorts of things. It's very simple. They walk out the first part of July and say most likely this is it. Now, if you've got plenty of forage, you go, well, that's fine. If you are short, you need to think about it.

Mr. LUCAS. Good point. And from there, on that next one about the post grazing or post-fire grazing tactics, because mimicking Mother Nature with controlled ones has become a big thing in my part of Oklahoma to control.

Mr. HEITSCHMIDT. The question that we're asking is we're doing some controlled burns in August, and then the next year we're coming and we're grazing immediately the next year, starting the next May, June, July, somewhere along there.

We're not resting for an entire year or resting for two years, which is often recommended by agencies and the like. The questions that we're trying to answer is how long should you rest, under what conditions does it require longer rest. And if you choose not to rest, then how should you graze it.

We burned in 2003, and we followed it the next year, which was very, very dry. We burned in 2004, and this year we're following it, and it's very wet. So Dr. Vemier [ph.] has a good handle on two different conditions of burning and how to manage that.

And what we have found is that if you manage at least with using the type of system we use, which is not year-long grazing, but, in fact, periodic grazing—animals might be out there for 3 weeks, 4 weeks, and that's all, at a moderate rate—there seems to be benefits to that, or at least it doesn't do anything disastrous to the entire system. So that's an area that we just started on. Dr. Vemier, our burn program has only been in effect or—he's been here for, I think, 5 years, 4 years. He's an Oklahoma State individual, Texas Tech, and so he had a lot of burning experience. And we believe that fire is a management tool that you can certainly use in these lands.

Mr. LUCAS. Fascinating. So if the 90 percent of your forage is on the ground by July 1, by August typically you're nice and dry to get a really hot burn, so the ground then stays essentially bare until the next spring, and the grass comes up on its own cycle after the moisture.

Mr. HEITSCHMIDT. Yes, we can get a small amount of regrowth in the fall, but it is not major. But that's one of those 1 or 2 percent things.

Mr. LUCAS. Could you touch for a moment on your cow that is the blueprint for bovine species, so to speak, on the genome effort?

Mr. HEITSCHMIDT. Well, this is based—largely the value of these animals is that we have the records since 1934 on their pedigree. We know precisely, and, in fact, we know some before that. So there's also an interconnectedness because of inbreeding and the like, between the males and the females, so that makes these animals extremely valuable for this sort of effort.

Now, one of the questions that is going to be asked after sequencing is, well, is the sequence of a Line 1 Hereford pretty much the

sequence of all other breeds of cattle. And those are things that will have to be answered. But if you have to start somewhere, you want to start with an animal that has a long history, that you know that history. And that's what makes Line 1 very unique in this aspect.

Mr. LUCAS. Any questions, Mr. Rehberg?

Mr. REHBERG. Well, I noticed you slipped in Oklahoma State, but you haven't said anything about goats.

Mr. HEITSCHMIDT. We can talk about goats, because we're starting some work on noxious weeds, and goats have a big role to play.

Mr. REHBERG. That's actually what I wanted to bring up, Leafy Spurge and some of the work you're doing on the impact of grazing as it relates to noxious weeds and Leafy Spurge. Maybe you could talk a little bit about that.

Mr. HEITSCHMIDT. Just very briefly, it's our belief that one of the largest threats to the range livestock industry in the next 50 years is going to be noxious weeds. There is a lot of other things we can see down the road, but noxious weeds seems to be something that is invading most every place.

We don't have a major problem with noxious weeds here yet, not like western Montana, not like North Dakota. In some of our country we have some noxious weeds that are a big problem.

We decided that that was an important avenue to get into, because nobody really is studying very much how do you use animals to manage—not necessarily control, but to manage noxious weeds. So we have just moved into an arena. We don't know how you manage livestock to prevent the ingress of noxious weeds.

This means you need to know everything you can about the noxious weed, as well as the animal, and then if you do have an infestation, how do you use animals to manage that infestation. And if you are successful in controlling that, how do you use animals in restoration of the ecological system.

And so we have got a new program that we have started with an ecologist from Montana State University—he got his Ph.D. up there—and a ruminant nutritionist out of New Mexico State University, and those two are married together trying to look at those questions.

And that's basically what we're trying to do with that program. We're trying to get ahead. People have a tendency with noxious weeds to say they are not my problem as long as they're over the hill. And probably it's too late once they get to you, so we're trying to be proactive and trying to understand this and be able to make some headway there, and it's a long-term endeavor.

Mr. REHBERG. The 1,500 cows that you've got listed on the chart, is that down from where you're carrying capacity is and a reflection of the drought? How are you managing numbers for the drought.

And then my second question is: How many pastures do you have, and what kind of a grazing procedure do you have? Are you intensive grazing? Do you have rest rotation? How do the numbers and the pastures relate to what you're trying to do with the drought?

Mr. HEITSCHMIDT. We have probably had more animals than we really desired over the last few years, just as everybody else did.

What we have done in the last year or so is wean early on a lot of our animals, and cull early, so our numbers are down a little bit.

I would say that on the normal we have had at times up to 1,850 to 1,900 breeding animals, and we're down about 300 from that. But it depends on the research as to what we're doing. So we have cut back, and what we're doing right now is not increasing.

I'm not convinced that the drought is over. This is a wonderful opportunity to stay where we are and keep our numbers down a little bit and make some improvement over time.

Grazing systems—we do work in grazing systems. We have, I'm going to say, probably between 30 and 40 pastures ranging in size from a few hundred acres up to 5,000 acres. We do not have a grazing system, per se, largely because the physiology and genetics research does not really allow us to manage those animals in that way.

For example, single sire breeding seasons, you more or less have to go to the same pastures every year with the same animals so they get grazed basically the same time every year. But we don't graze anything continuously. We have some sort of rest rotation at all times, but it is not set. It isn't let's graze in June, let's rest in July, let's graze in August. It more depends upon what our research needs.

We would like to do that, but it just doesn't work very well when we have the sort of demands we have on our research on those animals.

Mr. REHBERG. As it relates then, the drought to the late calving—I'm an advocate of late calving, except that part of the problem we have had is that historically within the last 7 years—first of all, what's your rainfall here?

Mr. HEITSCHMIDT. It is 13½ inches.

Mr. REHBERG. Historically in the last 7 years and we have had a little bit of moisture over the winter, and it's tapered off, and we have never really gotten our spring rain like we wanted, and certainly none over the summer, so your pasture trails off very quickly during that drought. How have you seen it affect your late calving concept and research.

Mr. HEITSCHMIDT. Surprisingly, we have found that our late calving in June has had some real advantages. We were surprised. We anticipated that we would have problems breeding those animals. That was kind of our hypothesis of trying to breed in September, August, September, October, along in that time.

We have seen no effect of that. We have not reduced conception rates, and we, in fact, have improved ourself in terms of profit by calving in June, because we can take a cow and there are instances where we never fed them a thing all winter long, nothing. Because you think about it, those animals go into April, May before they start calving. They have got an opportunity to replenish their reserves on their own.

Now, having said that, we also in one winter of the three-year experiment began supplementing or feeding all the animals in November, because we iced over, and it was iced over until March. And so that's the reason we had to feed. And I think that's part of the reason that we tend to do that here.

I think there are several reasons. One is tradition that we calf when we do, in February and March. One is, well, we're going to be feeding. We might as well just calve. One is I have got other things to do in June, like farm. So there's lots of reasons, but certainly you cut back on weaning weight considerably. We know that. But the animals make it up fairly rapidly.

So there's some opportunities for people to do that in June, and you'll hit a little better market in many instances, because everybody goes October or November now. You're going to go at a different time. There is some advantages and disadvantages.

Mr. LUCAS. To follow up on Mr. Rehberg's question, even with the decline in pasture quality, there's still a solid re-preg rate on those late calvers.

Mr. HEITSCHMIDT. Yes.

Mr. LUCAS. What is your summertime temperatures in August?

Mr. HEITSCHMIDT. It depends on which August you want to talk about. We have been this year—I would say in the last month we have been over 100 maybe 10 to 15 days. 109 is the most we have seen. But generally I would say 100 degrees in Miles City 5 to 10 days out of summer. Probably 5 days is about average.

Mr. LUCAS. So even then with the pasture quality decline, the temperature doesn't get—to the south of you a thousand miles, that is one of the changes. We have July and August 106 and 107 week after week after week, and everything shuts down.

Mr. HEITSCHMIDT. That's right.

Mr. LUCAS. But then in my part of western Oklahoma we get the palatial average of 24 inches of rain a year, so we are swamped compared to you. I would readily admit that.

Talking about the weeds for a moment, we have challenges down south with musk and scotch thistle. Is that an issue in this neck of the woods, too?

Mr. HEITSCHMIDT. We have Canadian thistle, which is much like musk thistle. Musk Thistle has the same growing morphology as the Canadian thistle. They are much the same. But we do have that, and you will see spots of it, not as severe. Having come from Kansas when I was a child, we didn't have musk thistle, and when we sold our place a few years ago, it was all over, and you would have to work hard to keep it out. It's very expensive.

Mr. LUCAS. Tell me about the budget that you work under here with the facilities you have, the ongoing research, how you allocate money. Just maintaining this facility, 400 miles of fences, 200 miles of road, that would be a rancher's nightmare right there, just capital cost.

Mr. HEITSCHMIDT. Well, one of the things that you have to do when we're budgeting these sorts of things, we believe very strongly as a staff that the place needs to be taken care of. You've got to take care of your infrastructure.

So we have a certain amount of our budget that is allocated for maintenance. We put a certain amount of our budget into maintenance. Other than that, you take out your salaries, and then you go with the scientists, how much do you need to get your project done. And anything that is left over, we try to run the place on, and it's getting very tight.

The thing that most people don't think about when they build a facility like this is the cost of maintenance and the increased cost of energy to heat, cool, turn the lights on. So you have to be very careful there and watch what you're doing there.

And with the increase in energy, we do use a lot of gasoline and the like around here. We have 800 acres of irrigation. That means we use a lot of electricity. We have three pumps in the river.

Mr. LUCAS. You pump with electricity?

Mr. HEITSCHMIDT. Yes. And our bill has increased dramatically, and it's a continuing challenge. If increases don't come fairly regularly to a location like this, your project begins to suffer, and you lose effectiveness. Before long, you don't have money to do the research. You're in a real mess.

So people need to understand that if you don't get increases every couple years, it really begins to impact, just simply because of inflation. So we have a very strict budget.

One of the things that helps us tremendously, we have a real close relationship with Montana State University. They are as good a cooperator as you would ever find.

I find other laboratories, working with their institution, their land grant institutions do not do nearly what we do with Montana State. And during this drought there was a little blessing that a lot of people didn't recognize. That was our sales of animals, culling. We were getting a darn good price.

And when we got that price, we then sustained a certain amount, because we can charge some things over, in terms of feed and the like for the animals can go on to Montana State University. So it's a job of where we balance those two. And this drought and the price of animals we have had during this drought, people have really been fortunate that they got the money that they got when they did de-stock.

Mr. LUCAS. That's true.

Mr. REHBERG. You mentioned the word "profitability." How do you differentiate between the Government support as kind of a false profitability, and the profitability of the ranch? Are you able to quantify that, based upon price and weaning and late calving.

Mr. HEITSCHMIDT. Mr. Lucas will appreciate this. We go to an agriculture economist. And we work with Mike Tess, Dr. Tess at Montana State, primarily, and we just do a budget. And we keep track of all the input cost, including the labor, and we look at the selling price, all of those sorts of things. It's a budgeting process.

Mr. REHBERG. Does your research data show that?

Mr. HEITSCHMIDT. Yes.

Mr. REHBERG. Does it break it down so if we were to access—

Mr. HEITSCHMIDT. Yes. There's an article in there, at least one on it.

Mr. REHBERG. For those of us who are trying to use this data on our own individual farms and ranches, we don't have the advantages of having a building like this, but we don't need it either. But there is some support that comes out of this building towards the ranch operation, so it breaks it down.

Mr. HEITSCHMIDT. It breaks it down in there, yes.

Mr. LUCAS. I would note for the benefit of our citizens here today that having a degree in agriculture economics, which the doctor

was politely eluding to, my wife has made a point for me to restrain the topic in front of real people. She seems to think it is a yawner.

Any more questions?

Mr. REHBERG. No.

Mr. LUCAS. I think, Doctor, you've answered our questions, and I appreciate the cooperation you and all your folks have shown today. And with that, I think we will adjourn this hearing and continue our view of what all is going on here.

And without objection, the record for today's hearing will remain open for 10 days to receive additional information, supplemental material, written response from any witnesses to any questions posed by the members. This panel hearing on the Subcommittee on Conservation, Credit, Rural Development and Research is adjourned.

Mr. REHBERG. Thank you.

[Whereupon, at 2:09 p.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

STATEMENT OF ROD HEITSCHMIDT

Mr. Chairman, and members of the subcommittee, I thank you on behalf of the entire Fort Keogh staff for this opportunity to provide a brief overview of the rich history of Fort Keogh, past research accomplishments, and current research goals and objectives. As you have probably already discovered, Fort Keogh is very proud of its research accomplishments, past, present and projected, and we thank you for honoring us with this opportunity.

EARLY HISTORY

The Cantonment at Tongue River, the precursor to Fort Keogh, was established near the mouth of the Tongue River on August 28, 1876. The name Fort Keogh first appeared on the Post Return in October 1877. The War Department officially designated the name of Fort Keogh on November 8, 1878.

Fort Keogh was named after Captain Myles Walter Keogh. Miles City was named after Colonel Nelson Appleton Miles, the first Commander of Fort Keogh.

Colonel Miles chose a site about 1 mile west of the original cantonment for the permanent Fort Keogh. Construction of the Fort began in 1877 in concert with the "June rise" of the Yellowstone River thereby facilitating the arrival of about 500 people and associated building materials via steamboats. By the end of 1877, Fort Keogh had been turned into one of the largest Army posts in the U.S. with more than 25 buildings. Fort Keogh was considered the most "livable" Post of the West.

Fort Keogh continued as an Army Post until October 27, 1908. In 1909, Fort Keogh was resurrected as a Remount Station raising horses for the U.S. cavalry. In 1916 at the height of World War I, Fort Keogh's horse inventory was 1,773 horses. It is rumored that 100,000 horses were processed through Fort Keogh during its Remount days but I am unaware of any published data supporting this claim. But there is little doubt that Fort Keogh was an important Remount Station during the period from 1909 to 1924 at which time the Remount Station was closed and the Fort was turned over to the United States Department of Agriculture.

For a more detailed history of Fort Keogh as a military post, we recommend reading the California State University M.A. thesis of Josef James Warhank entitled "Fort Keogh: Cutting Edge of a Culture." A copy of the thesis can be found on the Fort Keogh web site (<http://www.ars.usda.gov/npa/ftkeogh>).

HISTORICAL RESEARCH ENDEAVORS AND ACCOMPLISHMENTS

The focus of the earliest research at Fort Keogh was on animal genetics and rangeland ecology and management with animal reproduction and nutrition playing key contributing roles. Evidence of the key role animal genetics research has played at Fort Keogh is gleaned from the fact that since 1924, we have conducted fundamental genetic research on sheep; milking shorthorns; Belgian, Morgan, and Thoroughbred horses; turkeys; swine; and beef cattle. Today, however, our on-station genetics animals are limited to 2 beef cattle herds as the milking shorthorn

herd was dispersed in the late 1930's, turkeys in 1939, sheep in 1941, horses in 1964, and swine in 1986. Significant program accomplishments in animal genetics include:

- Identifying the effects of inbreeding in turkeys on fertility, egg production, egg weight, and egg hatchability;
- Providing original crosses of turkeys that led to the development of the Beltsville White breed, the first meat-type turkey developed in the U.S.;
- Developing the Morgan x Thoroughbred cross as the "ultimate cow horse for the 1920's and 1930's";
- Developing the Montana No. 1 breed of hogs;
- Developing Line 1 Hereford cattle, the oldest and probably purest line of Herefords in the entire world having been line bred at Fort Keogh since 1934. Today, the Line 1 selection project is the longest-running beef cattle selection program in the world. The importance of these animals to beef cattle genetics research is clearly reflected by the selection of a Line 1 female, L1 Dominette 01449, for the sequencing of the beef cattle genome by USDA-ARS and several cooperating Universities. In addition, it has been estimated that more than 70 percent of all purebred Herefords have some Line 1 breeding in their pedigree;
- Pioneering concept and protocols for genetic evaluation of beef cattle wherein selection standards were changed from visual appraisals to quantified performance standards. This single accomplishment had and continues to have tremendous impact on beef cattle seed stock breeding programs as evidenced by today's breeding standards;
- Computing first heritability estimates for performance traits of beef cattle;
- Quantifying the relative effects of heredity vs. environment on beef cattle performance;
- Establishing some of the earliest cross-breeding programs in the U.S. leading to today's standard cross-breeding programs;
- Participating in the USDA-ARS Germplasm Evaluation program through the use of Fort Keogh Angus, Red Poll, Pinzgauer, and Simmental sires;
- Developing a stable composite gene combination (CGC) herd of beef cattle consisting of a cross of one-half Red Angus, one-quarter Tarentaise, and one-quarter Charolais;
- Quantifying impacts of an array of selection criterion on beef cattle performance including selection for yearling weight (Line 1), birth weight (Line 1 & CGC), and the ratio between cow weights and calf weaning weights (CGC);
- Identifying functional alleles controlling double muscling in beef cattle; and
- Pioneering selection indices that optimize economic profits.

Although reproductive performance has always been an important aspect of the Fort Keogh research program, our reproductive physiology program did not officially begin until 1960. Significant accomplishments in the reproductive physiology program include:

- Pioneering development of equine semen collection and AI technologies;
- Developing methods to control brucellosis under rangeland grazing conditions;
- Identifying key post-weaning nutritional regimens for expediting heifer puberty;
- Discovering that although zeranol implants (i.e., Ralgro) increase rates of gain, they also reduce heifer pregnancy rates and bull testicle size and semen production;
- Showing that replacement heifer pregnancy rates increase dramatically if heifers are cycling prior to the beginning of the breeding season;
- Learning that heifer puberty is a function of an array of factors other than solely a function of body composition;
- Showing that calf birth weight is the primary factor affecting dystocia (i.e., delayed and difficult birthing);
- Learning that cows given obstetrical assistance in a timely manner display increased fertility the following year;
- Developing protocols for improving postpartum reproduction success such as early weaning and feeding of supplements that improve cow nutritional status;
- Showing that a minimum condition score of 5 at calving is an excellent means of improving postpartum conception rates;
- Developing effective beef cattle breeding synchronization protocols using a combination of progestogen and prostaglandin;
- Identifying synchronization of estrus and gonadotropin superovulation treatments as effective management treatments for increasing twinning in beef cattle; and
- Discovering, in cooperation with personnel at Iowa State University and the University of Iowa, the mode of action (i.e., reduced blood flow to placenta) of the compound (i.e., isocupressic acid) in Ponderosa pine needles whereby cows calve pre-

maturely when consuming Ponderosa pine needles in the last trimester of pregnancy.

Fundamental treatments in most beef cattle production studies are nutritional because of the profound impact of nutrition on animal growth and reproduction. Thus, nutrition research has always been a cornerstone of the Fort Keogh animal research program. For example, many studies were initiated in the early years to determine the value of various, locally produced feedstuffs (e.g., alfalfa hay, corn silage, wheatgrass hay, barley, and wheat mill screenings) on cattle, sheep, swine, horses, and turkey performance. Still, a formal rangeland animal nutrition program was only begun in 1971. Significant nutrition research accomplishments include:

- Pioneering studies showing grazing time, forage intake, and forage digestibility decline in concert with declining air temperatures;
- Finding that most winter, free-ranging beef cattle nutritional short-comings in northern Great Plains rangelands are related to protein rather than energy constraints. Results are the product of a series of multi-year studies designed to quantify the seasonal dynamics in crude protein content and digestibility of rangeland forages;
- Discovering that the effects of protein supplementation during winter on beef cow performance is tied closely to quantity and quality of forage available which in turn is largely the product of previous year's forage production and current year's amount of snow cover;
- Finding that time of day when animals are fed supplement affects forage intake as steers fed energy supplement in morning (7:30 a.m.) eat less and diets are lower in digestible energy intake than steers fed in early afternoon (1:30 p.m.);
- Learning that early weaned calves (84 days) can be raised on commonly available feedstuffs and that performance dramatically exceeds that of suckling calves;
- Developing state-of-the-art technologies for frequent measuring of animal weights, water intake, diet quality, forage intake, and rates of passage of free-ranging grazing beef cattle;
- Quantifying the positive effect of cows grazing perennial, cool-season dominated seeded pastures in early spring as compared to grazing of native rangeland;
- Discovering that steers with high growth potential gain faster on finishing diets than lower growth potential steers resulting in greater meat production and carcass weights of leaner grade at comparable levels of efficiency. However, carcass size when steers reached choice grade were above that required to maximize economic returns;
- Quantifying positive impacts of 2X intensive early season stocking of stocker steers on production per acre;
- Identifying mineral nutritional short-comings in rangeland forages; and
- Quantifying the economic merits of a late spring (June) calving season as compared to late winter (February) and early spring (April) calving seasons.

Range management research was initiated at Fort Keogh in 1932 under the direction of the U.S. Forest Service. Since that time, there have been a number of major accomplishments including:

- Defining appropriate "safe" or "fully sustainable" stocking rates for this region. These 35-year stocking rate studies were the first long-term stocking rate studies conducted in the United States;
- These long-term studies (i.e. 1935–1970) also provided critical information as to the varied impacts of drought on northern Great Plains rangelands. Research documented the decline of important species during drought and their subsequent recovery;
- Studies also documented the detrimental effects of drought on cow-calf production and the interaction effects of varying stocking rates on production whereby declines in production are magnified as rates of stocking are increased;
- Quantifying the relative merits of a wide array of seeded forages in beef cattle grazing systems. Two seeded species identified as particularly adapted to this region are crested wheatgrass and Russian wildrye both of which repeatedly provide an abundance of high quality spring forage over a series of years (i.e., persistence) when properly managed;
- Discovering fall planting of most seeded species enhances stand established over spring planting;
- Quantifying the effects of a wide array of range improvement practices on rangeland forage and livestock production. Practices evaluated included soil tillage and furrowing, water spreading, fertilization, burning, and herbicide applications. In every evaluation, results showed that the merits of each practice was tied closely to the situation at hand and selection of the "best management practice" was linked to managers' understanding of the ecological effects of the selected practice;

- Documenting that the major factor affecting the productivity and condition of northern Great Plains rangelands is climatic conditions rather than management factors. Information has played a major role in the development of sustainable beef cattle production systems as successful managers fully recognize these said constraints and in turn, adopt highly flexible management strategies;

- Defining the capacity of northern Great Plains rangelands to sustain themselves as perennial, cool-season grasslands as opposed to shifting to a dominance of annual grasses. Results show that plant species composition of Northern Great Plains rangelands is relatively stable with minimal shift toward a dominance of annual grasses similar to the Great Basin region of North America;

- Developing detailed understandings of the ecological role Japanese brome plays in the Great Plains. Japanese brome is the dominant, non-indigenous, invading annual grass in the Great Plains. These detailed understandings greatly enhance land managers' ability to affect rates and extent of invasion on an annual basis and thereby limit long-term detrimental impacts on ecological condition and livestock production;

- Providing visual documentation, via repeat photography of Northern Great Plains rangelands over an 80-year period, that ecological condition has not declined but rather remained constant, or in most instances, dramatically improved; and

- Developing a simple, easy-to-use, effective drought management decision support system that dramatically reduces grazer's ecological and economical risks.

For a more detailed explanation of historical research findings, we recommend reviewing our "Historical Perspectives" articles published in our 1993 Field Day Report, a copy of which can be found on our web site (<http://www.ars.usda.gov/npa/fikeogh>).

CURRENT RESOURCES

Originally, the Fort consisted of 90 to 100 sections of land extending approximately 10 miles south and west of the confluence of the Tongue and Yellowstone Rivers. Today the Fort consists of about 85 sections of land giving way to the development of the community of Miles City. Boundaries today extend about 6.5 miles directly west of the confluence of the Tongue and Yellowstone Rivers, which is about 2 miles west of where the mouth of the Tongue River was located in 1876, then 10 miles directly south, about 11 miles back east to the Tongue River, then north east along the Tongue River, our east boundary, to the Yellowstone River.

Currently, Fort Keogh consists of about 50,000 acres of native rangeland, 3,000 acres of seeded dryland pasture, 1,000 acres of seeded irrigated pasture, 800 acres of irrigated cropland (i.e., corn silage, alfalfa and barley hay, and sudan sorghum), 1260 acres of Yellowstone River with 400 acres of river islands, and 1,350 acres of corrals, headquarters area, I-94, et cetera. We have about 220 miles of roads and vehicle trails and 400 miles of fence.

Our current animal breeding female inventory consists of 215 Registered Line 1, 514 CGC, 463 reproductive physiology, 274 nutrition, and 65 "other" (Total = 1,531). We have 86 breeding bulls and 1,061 calves. We have a total of 24 horses at Fort Keogh of which about half are owed by workers and the other half by Fort Keogh.

The full-time USDA-ARS staff consists of 10 scientists, 11 technicians, and 7 administrative. The temporary staff of 5 to 10 employees is employed at various times during each year. ARS funding of the laboratory for fiscal year 2005 is \$3.1 million.

Fort Keogh is run in cooperation with the Montana Agriculture Experiment Station (MAES). The full-time MAES staff at Fort Keogh consists of 18 ranch/farm workers, two professionals and one administrative assistant. A temporary staff of four to six workers is present at various times during the year. Funds to support this staff are generated through a Specific Cooperative Agreement between ARS and Montana State University (MSU) and by the sale of livestock. This is possible because all the livestock at Fort Keogh belong to MAES. No State of Montana funds are appropriated for the operation of Fort Keogh.

In addition, two full-time MSU Extension Service personnel have offices at Fort Keogh. Fort Keogh provides administrative support for both the Eastern Regional Department Head and the Beef Cattle Specialist.

Fort Keogh has a full array of farm and ranch facilities and the needed equipment required to meet research needs. We have a modern laboratory/office complex that doubled in size in 2004 when two additions were added onto the building, a 39,000 bushel automated feedmill, two feedlots with a total capacity of about 1,000 head, plus 43 "out" buildings including barns, sheds, shops, storage garages, etc. We have three buildings listed on the National Register of Historic Places. These are the recently restored water wagon house built in 1883, the first ARS office building built originally in 1920 to serve as a mess hall for the Remount Depot and now used as

a carpenter shop and storage area, and the horse barn built in 1934 to facilitate equine research and now used as the working headquarters for our cowboy crews.

CURRENT RESEARCH PROGRAM

The mission of the Fort Keogh Livestock and Range Research Laboratory is to research and develop ecologically and economically sustainable rangeland based livestock production systems. Our research program is centered on the 2 fundamental components of rangeland based, livestock production systems, that being the rangeland resource and the grazing animals.

The focus of our rangeland research program is to develop sustainable management schemes that reduce both ecological and economic risks. This project is a component of ARS' National Program on Rangeland, Pasture and Forages. It is entitled "Low Risk Management Strategies for Sustaining Range Beef Cattle Production Systems." The project is supported by 5 scientists.

Program justification centers on the idea that rangeland agriculture (i.e., grazing) is a high risk venture subject to considerable ecological and economic risks. Its sustainability is linked, therefore, to grazers' ability to manage these high levels of uncertainty over both time and space. The research is designed to reduce levels of risk by: (1) improving our understanding of both the short- and long-term ecological consequences of climatic conditions, particularly drought, and various grazing tactics; (2) developing proactive, early warning drought management strategies; (3) screening newly developed forage germplasm for persistence, potential productivity, and quality as they relate to grazing animals' performance and productivity; (4) developing improved methods for assessing forage quality; (5) determining the mechanisms responsible for differing levels of beef cattle production as a function of differing seasons of calving; (6) identifying the economic merits of varying seasons of calving and subsequent post-weaning management strategies, and (7) identifying innovative livestock management strategies that impede the ingress of noxious weeds in northern Great Plains rangeland ecosystems. In addition, a portion of this research is designed to quantify the capacity of Northern Great Plains rangelands to sequester and store atmospheric carbon. Such information is vital for the development of sound, national, climate-change-related, land management policies particularly in light of the vast amounts of rangelands located in the Northern Great Plains region as well as across the United States.

Examples of recent accomplishments include:

- The successful development of a simple, user-friendly, drought management decision support system,
- The identification of "best management" post-fire grazing tactics to enhance the ecological health of the range resource and concurrently reduce economic losses sustained from wildfires,
- Finding that rates of carbon sequestration in these grasslands are generally low and they are affected more by climatic conditions than grazing tactics, and
- Determining that late spring (June) calving can increase profits over spring calving by reducing input costs.

The focus of our animal research program is to develop a productive, ecologically superior beef cow. This project is a component of ARS' National Program for Food Animal Production. It is entitled "Developing Beef Cattle Better Suited for Sustainable Production." The project is supported by four scientists.

The central theme of this program is to lay a foundation for accelerating genetic improvement toward more efficient, profitable and sustainable beef production by reducing input costs arising from use of harvested feeds. It is predicated on the assumption that cost of external energy needed to produce harvested feeds will increase causing a concurrent increase in costs of traditional production systems. Successful reproduction is the single largest determinant of biological and economical efficiencies of cow-calf production and no production system is sustainable without it. Many commonly measured phenotypes indicative of reproductive success by beef females have low heritability and are measured relatively late in life compared to growth and carcass characteristics. Acceleration of genetic improvement requires selection criteria of higher heritability that can be measured earlier in life than those presently available. Thus, our goals are to: (1) better understand indicators of reproductive success and failure, (2) determine quantitative and molecular relationships between traits measured early in life and lifetime reproductive performance, (3) evaluate opportunities to identify animals that are reproductively efficient with less reliance on harvested feeds, and (4) develop tools to aid producers in making selection decisions. Our approaches integrate basic physiological mechanisms controlling reproduction with quantitative and molecular genetics characterization. Bringing

this research to fruition will contribute to (1) understanding mechanisms controlling reproductive success and failure under nutritionally stressful conditions and (2) knowledge needed by beef producers to make informed selection decisions that improve production efficiency, profitability, and sustainability in the future.

Examples of recent accomplishments include:

- The development of sire selection indices that optimize profit from future progeny,
- The identification of size of an ovulatory follicle as a key indicator of cow reproductive capacity,
- The discovery of key quantitative trait loci that affect growth, carcass characteristics, and palatability of beef, and
- Providing key resources for the international bovine genome sequencing project.

For a detailed explanation of on-going research projects supporting the above 2 research programs, please review our 2005 Research Update found on our web site (<http://www.ars.usda.gov/npa/ftkeogh>).

This concludes my testimony, Mr. Chairman, and I will be happy to answer any questions you or the other members of the subcommittee may have at this time.

LETTER OF WILLIAM H. DANFORTH

Dear Chairman Lucas: I write to congratulate you for calling a hearing to review agriculture research at the U.S. Department of Agriculture Research Service Fort Keogh Livestock and Range Research Laboratory in Miles City, Montana. I believe that dedicating time to review agriculture research is a valuable endeavor directly tied to the sustainability and future competitiveness of American agriculture.

As you may know, I chaired the Research, Education and Economics Task Force of the USDA authorized by the 2002 farm bill which recommended the creation of a National Institute for Food and Agriculture (NIFA) to supplement and enhance the existing research programs of the USDA. As envisioned, NIFA would award competitive peer-reviewed grants to support and promote the very highest caliber of basic agricultural research. This type of research should be familiar to the Fort Keogh laboratory because I understand this is where much of the exciting work on bovine sequencing is being carried out. It is precisely this type of basic research, in both plants and animals that will lead to greater advances in applied agriculture science and deliver greater benefits for humankind. Disease-resistance, drought tolerance, higher yields and improved nutrition are all achievable through basic research and represent boundless opportunities across the globe. This is why groups such as the National Cattlemen's Beef Association and the American Soybean Association have publicly endorsed the NIFA proposal.

Evaluating the state of agriculture research is an important step in the construction of the next farm bill. In doing so, I hope you will thoughtfully consider during farm bill reauthorization the creation of NIFA to strengthen the apparatus of agriculture research by adding a competitive, basic research component. If I may be of any assistance during this process, please let me know.

